Surgical Planing of the Skin

Evaluation of a Method for Reducing Scars and Other Defects

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• **Skin defects such as pitted acne scars, unsightly moles and birthmarks, and other disfiguring skin deformities can be effectively corrected with good cosmetic results. This is accomplished as an office procedure by abrading or planing the skin with a rapidly rotating wire brush using a local anesthetic. The treatment does not require hospitalization and is relatively simple and painless.**

CUTANEOUS DEFECTS of the face or other exposed areas can affect the mental stability of children and adults alike. These abnormalities are of importance because they may result in personality changes and be a distinct social or economic handicap. The dermatologist or other physician who underestimates the psychological influence of such defects does the patient a grave injustice. The improvement of scars from acne, trauma or other disease, and the removal of pigmentations and certain congenital and acquired abnormalities can now be effectively accomplished with a technique of planing by a rotary wire brush.

HISTORY

Twentieth century dermatologists have commonly employed electrodesiccation, carbon dioxide snow, liquid nitrogen, trichloracetic acid, phenol and a variety of other agents in the treatment of some of the above conditions. The results have varied according to the skill and patience of the individual physician.

Cosmetic surgery became an important part of dermatology in the early 1900's when Kromayer[10] adapted hand and motor-powered instruments to dermatologic operations. He employed rotary steel burrs in an attempt to remove a number of congenital and acquired abnormalities of the skin. Although he became quite adept in their use, his techniques were not widely practiced. Sandpaper abrasion for traumatic tattoos and acne pits of the face was reported by Iverson[9] in 1947 and McEvitt[14] in 1950. As a routine treatment it presented certain disadvantages in that it required hospitalization and general anesthesia. Kurtin[11] in 1953 reported on corrective surgical planing of the skin for acne scars and other skin defects in 273 patients. After five years of trial he developed a successful modification of the abrasion technique. This modification provided a simple office procedure employing local anesthesia with ethyl chloride and a motor-driven stainless steel wire brush. Since this initial report by Kurtin, a wave of enthusiasm productive of a number of reports[1,3,4,5,8,15] has spread throughout the country. Dermatologists, plastic surgeons and other specialists are utilizing this and similar techniques on a wide scale for the improvement (not necessarily the complete removal) of scars and cutaneous defects.

During the past two years the author has used the abrasion technique—so-called dermabrasion[1]—described by Kurtin,[11] in which abrasion is made with a rapidly rotating wire brush held perpendicular to the skin surface. The accompanying photomicrographs (Figure 1) obtained from repeated biopsies following dermabrasion, show that the entire epidermis and a portion of the corium is removed by the abrading action of the wire wheel. Within a few days, a firmly adherent inflammatory crust forms over the planed surface. The epidermis then rapidly regenerates from the follicular epithelium and is essentially complete on the eighth or ninth day.

OPERATIVE TECHNIQUE

Fifteen minutes before the procedure an analgesic agent is administered subcutaneously. At first Demerol® (meperidine hydrochloride) was used, but it had the disadvantage of rather slow onset and a longer duration of action than was desired. Later, 30 mg. of Nisentil®[6] (1,3-dimethyl-4-phenyl-4-propionoxy-piperidine hydrochloride [dl-alpha form]) administered subcutaneously, proved to be a more suitable agent in that it has a rapid onset of action and its major effect is over in two hours. The patient is then capable of leaving the office without disturbed sensorium or excessive drowsiness.

The face is thoroughly cleansed with a liquid germicidal detergent and cold packs are applied to the operative site. The specific areas for abrasion are painted with a solution containing 1 per cent gentian

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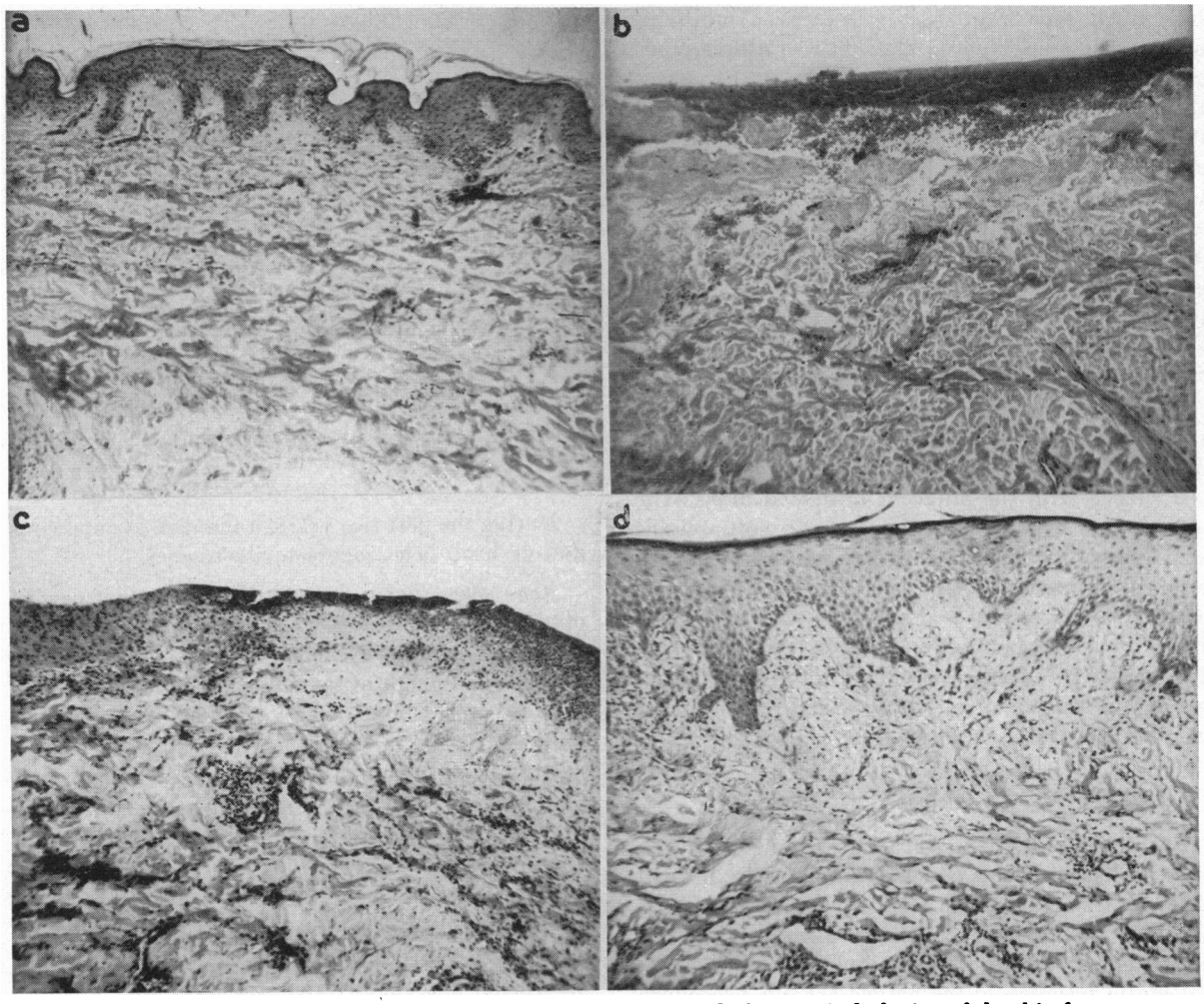

Figure 1.—Photomicrographs (× 50) of biopsies taken before and after surgical planing of the skin for acne scars. (a) Before planing; (b) immediately after planing to show removal of the epidermis and upper corium; (c) three days after planing to show formation of the inflammatory crust; (d) epidermal regeneration is complete on the eighth day.

violet in 10 per cent alcohol in order to delineate the depth of individual scars and the extent of the operative field.[8] When working on the face, a rubber dam[7] or lead shields are placed over the eyes of the patient as a precautionary measure, and ear and nose orifices are plugged with cotton. Although Kurtin and others have employed a mounted blower to accelerate evaporation of the volatile anesthetic and hence the freezing of the skin, the author has found a jet of compressed air equally effective. Ethyl chloride is sprayed in a coarse stream onto a portion of the area to be treated, and freezing to board-hardness occurs in about 30 seconds. Recently, the author has been using the refrigerant-anesthetic, dichlorotetrafluoro-ethane (Freon 114),[15] but to date, from a technical standpoint, has not found it as effective. In contrast to ethyl chloride, which can be irritating and toxic, Freon is noninflammable, relatively nontoxic and has no general anesthetic properties.

When the anesthetized site is solidified, the skin is then planed or abraded with a motor-driven rapidly rotating (12,000 revolutions per minute) stainless steel wire brush. The rotating brush is moved rapidly across the skin at right angles to the plane of the brush. Pressure is applied to the skin during the abrasion, but only experience can dictate the extent and degree. Too much pressure or too slow movement across the skin can result in gouging or grooving. Approximately three square inches of skin is solidified and abraded at a time and, if indicated, the entire face is treated at one session in the office. Following the abrasion there is mild oozing and bleeding from the treated sites for ten to twenty minutes. No serious loss of blood has occurred to date. Dry gauze sponges are applied and the patient is permitted to lie at rest. When most of the oozing and bleeding has stopped, the face or other site is redressed with dry sterile sponges held in position

by Scotch tape. No vaseline gauze or antibiotic ointment is used. Approximately two to three hours elapses between arrival and departure of the patient from the office. Postoperatively, the patient is instructed to change the bandages immediately on arriving home and then every two hours until bedtime, when all are removed. They are not reapplied at any time during the healing period. A crust forms in approximately three days and usually separates in ten days. Moderate edema of the entire face or treated site can be expected during the first 48 to 72 hours after operation. Any discomfort is usually controlled by acetylsalicylic acid.

Following the separation of the crust, the skin is soft, sensitive and erythematous. This erythema fades in three to eight weeks and the new skin gradually blends with the adjacent untreated areas. The healed sites are fresh in appearance, soft, pliable and without external evidence of cicatrization. Depending upon the process being treated, the entire procedure can be repeated any time after six weeks. Three or four planings may be indicated in deep acne scarring to obtain maximum improvement, but in the majority of disorders sufficient improvement is obtained after a single planing.

RESULTS

Surgical planing is useful for treating some developmental skin defects which were formerly untreatable. Scars that have resulted from injury or previous disease may be made considerably less noticeable by use of the technique.

Careful selection of the patient for this procedure is of utmost importance, and the individual's mental attitude should be evaluated in relation to his disease process. The entire procedure should be thoroughly discussed with the patient beforehand, and it is imperative that the physician avoid exaggerated claims. To predict total removal of a scar or defect and then not accomplish it can throw a patient into an episode of mental depression. Corrective surgical planing of the skin is not a cure-all, but from the patient's point of view it has been accepted with enthusiasm and satisfaction. What may appear objectively to the physician to be a minor improvement, is more often than not a major improvement to the patient.

For evaluation of results, black and white photographs and 35 mm. kodachrome transparencies are taken before and after the procedure. These are helpful in discussing the final result both subjectively and objectively. It must be borne in mind, however, that in a photograph a superficial cutaneous defect can be made to appear greatly improved or even be made to appear worse by merely shifting lights to make shadows on the cutaneous surface.

Figure 2.—*Left:* Before surgical planing of acne scars on cheek. *Right:* After therapy.

During the past two years, a number of cutaneous defects have been satisfactorily treated.

Acne scars. Some degree of improvement can be obtained in almost every instance of acne scarring. The degree of improvement, however, depends upon the type and depth of scars and the number of planings as well as the depth to which the physician abrades. Results are frequently satisfactory after a single planing, but in some instances two to four planings may be indicated. In no instance have keloids or postoperative infection resulted. Mild acne activity is not a contraindication and, in many patients, acne lesions do not reappear in the planed areas. In those persons having hundreds of small comedones and milia in association with acne, dermabrasion successfully removes these and leaves a flat, smooth surface (see Figure 2).

Chickenpox, smallpox, herpes zoster and herpes simplex scars are more successfully abraded than are acne scars. Since they are shallow and soft-walled, one or possibly two planings provide a satisfactory result to both patient and physician.

Superficial accidental tattoo marks can be abraded successfully. In decorative tattoos, however, the pigment is deposited more deeply in the corium and dermabrasion will frequently result in some scarring. Patients will occasionally prefer the scarring to the tattoo, but they should be informed of this disadvantage before the procedure is carried out.

Adenoma sebaceum. A single planing may remove all the lesions of adenoma sebaceum. The skin of a 13-year-old girl with small orange-red tumors of adenoma sebaceum on the face, of nine years' duration, was successfully abraded. When last observed some 12 months later the patient had no recurrence of lesions. Dermabrasion would seem the treatment of choice for this cutaneous defect (see Figure 3).

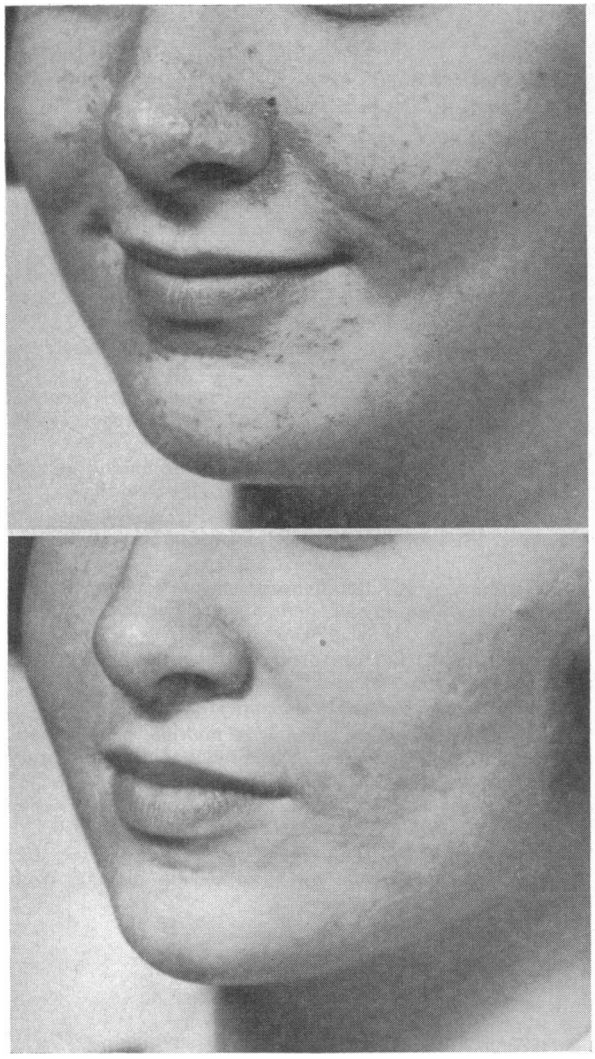

Figure 3.—Surgical planing of adenoma sebaceum on the face of a 13-year-old girl. *Upper:* Before therapy. *Lower:* After therapy.

Multiple benign cystic epithelioma may be similarly treated. Although the author has not planed a complete face for this disorder, in one case a small area was test-planed and the superficial lesions were effectively removed.[13]

Superficial wrinkles respond remarkably to a single planing. The regenerated skin is soft, pink and youthful in appearance. Results have been satisfying in almost every instance.

Keloids have been treated by planing deep into the corium as well as to skin level. Roentgen-ray therapy must follow the abrasion to prevent recurrence of the tumor. Ordinary keloids and those associated with acne have been treated but the author feels that, except in certain instances, not much is gained over surgical excision followed by x-radiation.

Traumatic hypertrophic and depressed scars have been successfully abraded. Complete removal has been virtually impossible but definite improvement is obtained in almost every instance.

Burn scars can be treated superficially to improve the surface irregularities, but deep removal should not be attempted owing to the absence of hair follicles and resultant slow healing.[11]

Skin graft sites and some traumatic linear scars can be successfully treated.

Acquired hyperpigmentation and certain pigmentary defects can be planed with relative ease and with satisfactory result. Lentigines, ephelides and chloasma fall into this grouping.

Vascular nevi such as portwine stains (nevus flammeus) have been abraded by other physicians, with 50 to 70 per cent improvement in the average case.[2,12] Prior to surgical planing, all therapy for this disorder when involving the face had been totally ineffective. In the author's experience, partial removal in one instance was satisfying and further abrasion is contemplated in the immediate future.

Pigmented nonvascular nevi, broad and linear nevi have responded to dermabrasion therapy.[11]

Large disfiguring senile and seborrheic keratoses can be fully removed by dermabrasion. The final result with treatment by this means is usually more cosmetically acceptable than that seen with other commonly used therapeutic methods.

As surgical planing is adapted to additional entities and more experience is gained with each cutaneous disorder, definite indications and contraindications will no doubt be established.

COMPLICATIONS AND SEQUELAE

No serious complications or sequelae have as yet been encountered during or after surgical planing of the skin. Those listed below are comparatively infrequent and merely mentioned for completeness to warn of their existence. That they do occur should in no way depreciate the value of dermabrasion.

No excessive loss of blood occurs during or after the procedure. In occasional patients the clinical manifestations of shock will develop immediately after the operation, but this is transient and rapidly disappears after a period of rest. At no time has it been necessary to institute therapy beyond rest.

Edema of the face or operative site can develop within an hour after the procedure and last as long as a week. The majority of patients, however, have only mild swelling of the face within 12 hours, which resolves itself without therapy in 72 hours. In one patient the edema was so massive as to cause

depression of the sensorium and complete closure of the eyelids for five days. Oral hydrocortisone therapy and cold packs aided its resolution. Surgical trauma and primary irritation from ethyl chloride are the factors that produce this postoperative edema.

Erythema following separation of the crusts is a normal consequence and gradually disappears in the majority of patients in four to six weeks. In an occasional patient, erythema may be more persistent and last as long as four months. Explanations have been given to account for this persistent erythema.[4]

Milia formation is not uncommon. It has been previously reported by other investigators.[1,4] They can be removed simply and effectively with the sharp tip of a No. 11 surgical blade.

Hyperpigmentation of the planed sites has been occasionally observed, by the author and others[1,4] a month or two following the procedure. It is usually mild and fades within a relatively short time without therapy. Delayed eczematous reactions and pyodermas have been reported,[4] but the author has not observed them.

In conclusion, surgical planing of the skin or dermabrasion by one experienced with the technique is the treatment of choice for a number of cutaneous defects. It is a safe and highly effective office procedure for conditions in which there was previously no effective treatment.

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